

# California Bay-Delta Program

## Levee System Integrity Program Multi-Year Program Plan (Years 4-7)

**Implementing Agencies:**

Department of Water Resources

Department of Fish and Game

United States Army Corps of Engineers

**August, 2003**



# Goals and Objectives

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## Goal of the Program and CALFED Record of Decision Commitments

The goal of the Levee System Integrity Program is to provide long-term protection for multiple Delta resources by maintaining and improving the integrity of the extensive Delta levees system. These efforts are being undertaken in a manner consistent with the Ecosystem Restoration Program and Conveyance Program.

The CALFED Record of Decision (ROD) identified five commitments to be met. For each ROD commitment, key objectives have been identified for the Levee System Integrity Program:

- **Provide Base Level Protection.**
  - Provide funding to help local reclamation districts reconstruct all Delta levees to a base level of protection (the PL 84-99 standard).
- **Implement Special Improvement Projects.**
  - Identify projects that will enhance flood protection beyond that provided by base level standard, necessary for identified public benefits including life and personal property protection, water quality, protecting agricultural production, and protecting ecosystems.
- **Implement a Levee Subsidence Control Plan.**
  - Develop “best management practices” to correct subsidence adjacent to levees.
  - Coordinate research to quantify effects and extent of inner-island subsidence.
- **Implement a Levee Emergency Management and Response Plan.**
  - Enhance the ability of local, State, and Federal agencies to rapidly respond to levee emergencies.
- **Perform a Delta Levee Risk Assessment.**
  - Perform a risk assessment to quantify the major risks to Delta resources from floods, seepage, subsidence and earthquakes, evaluate the consequences, and develop recommendations to manage the risk.

# Accomplishments

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## **Provide Base Level Protection**

- Improved 40 levee miles up to the PL 84-99 standard, including projects on Sherman, Bradford, and Jersey Islands and Webb Tract.

## **Implement Special Improvement Projects**

- Continued work on developing general permit terms and conditions with the Regional Water Quality Control Board (RWQCB) for dredging projects less than 100,000 cubic yards.
- Reused over 650,000 cubic yards of dredge material to increase levee stability and habitat enhancement.
- Initiated efforts to amend the Suisun Marsh Preservation Agreement and develop a long-term plan for levee protection consistent with regulatory permit requirements and endangered species protection.
- Complete the Suisun Marsh Levee Investigation, which will be considered when the Suisun Marsh is evaluated for inclusion in the Levee System Integrity Program.

## **Implement a Levee Subsidence Control Plan**

- Initiated a demonstration project on Twitchell Island to determine relationships between biomass accumulation, sediment deposition, and water management and to delineate priority areas on the island for subsidence control.
- Developed the Strategic Framework for Reversing the Effects of Subsidence in the Sacramento-San Joaquin Delta for guiding future broad-scale study of subsidence solutions.
- The Suisun Marsh Charter process is developing conceptual models that identify current and potential land management opportunities that may reduce ongoing subsidence. In addition, Amendment 2b of the Suisun Marsh Preservation Agreement (SMPA) includes a water management program that could also provide valuable data for modifying land management that would reduce subsidence and provide for sustainable wetland management.

## **Implement a Levee Emergency Management and Response Plan**

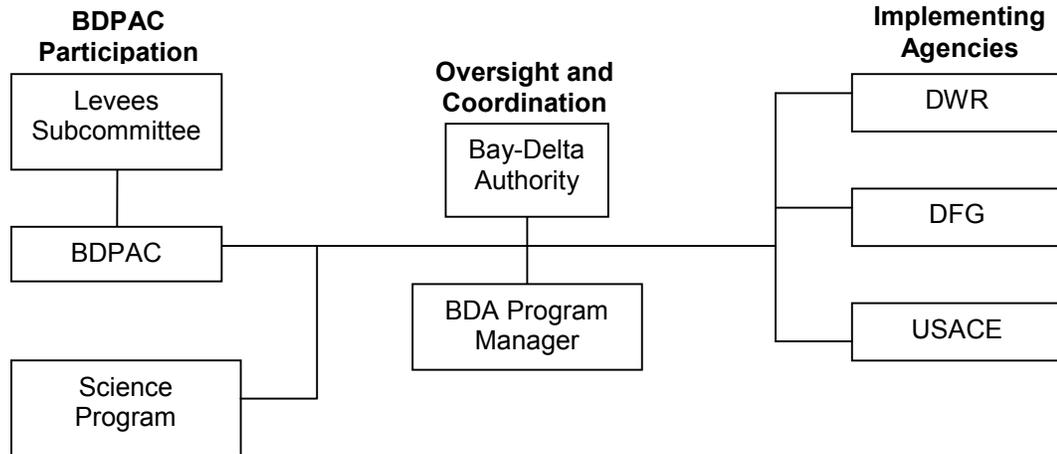
- Coordinated with three levee maintaining agencies (LMAs) and provided funds for emergency measures to prevent overtopping of the Van Sickle Island levee during high tide and high wind conditions.
- Provided emergency funding to control excessive seepage and levee erosion on Brannan Island.
- Provided funding to restore integrity to the Empire Tract levee that was subject to excessive seepage and erosion.

## **Perform a Delta Levee Risk Assessment**

- Developed Statement of Work to perform initial Risk Management Analysis study.

# Program Structure

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Agency	Roles and Responsibilities
California Bay-Delta Authority	<ul style="list-style-type: none"> <li>• Oversight and coordination</li> <li>• Risk assessment</li> </ul>
Department of Water Resources	<ul style="list-style-type: none"> <li>• Program management</li> <li>• Subventions</li> <li>• Special projects</li> <li>• Subsidence</li> <li>• Emergency response</li> <li>• Beneficial reuse</li> <li>• Suisun Marsh</li> </ul>
U.S. Army Corps of Engineers	<ul style="list-style-type: none"> <li>• Program management</li> <li>• Base Level Protection and Special improvements</li> <li>• Emergency response</li> <li>• Beneficial reuse</li> </ul>
Department of Fish and Game	<ul style="list-style-type: none"> <li>• Program management</li> <li>• Subventions</li> <li>• Special projects</li> </ul>

# Major Activities

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## Provide Base Level Protection

- **Subventions Program** – Continue to provide financial assistance to local agencies for maintenance and rehabilitation of non-project Delta levees consistent with net long-term habitat improvement.

**Schedule: The schedule has been significantly impacted by funding shortfalls, limited ability of local agencies to cost share, shortage of materials, and other problems. The program is maintaining the levees for participating Reclamation Districts and incrementally improving levees program-wide.**

## Implement Special Improvement Projects

- **USACE Studies: North Delta Improvement Project** - Sign amended Feasibility Cost Sharing Agreement and begin Feasibility study.

**Schedule: Summer 2005**

## Implement a Levee Subsidence Control Plan

- **Reuse of Dredge Material** - Continue reuse of dredge material to increase levee stability and habitat enhancement.

**Schedule: Given the limited availability of funding, this element is on schedule to achieve approximately 60% of the ROD commitment. The program remains committed to use available dredged material to strengthen levees wherever it is cost effective.**

- **Subsidence Reversal** – Continue Twitchell Island Subsidence Reversal Project.

**Schedule: Ongoing, with completion in December 2005**

## Implement a Levee Emergency Management and Response Plan

- **Delta-wide Asset Management System** - Develop a formal agreement for establishing mutual aid during flood fighting between six Delta counties and the state Office of Emergency Services.

**Schedule: Completion Summer 2005**

- **Standardized Emergency Management System (SEMS)** - Organize teams to conduct exercises with various reclamation districts, Delta Area Command, Flood Operations Center, Department of Forestry and Fire Prevention, and Civilian California Conservation Corps to encourage development of specific SEMS-compatible emergency response plans.

**Schedule: Completion Summer 2003**

- **Pre-positioned Assets** - Acquire and distribute 10 flood fight boxes and materials, including 100,000 sandbags, Plastic sheeting, wood stakes, and hand tools to key areas.

**Schedule: Completion Summer 2003**

## Perform a Delta Levee Risk Assessment

- **Risk Assessment Study** - Pursue contract award to perform initial Risk Management Analysis, and begin study.

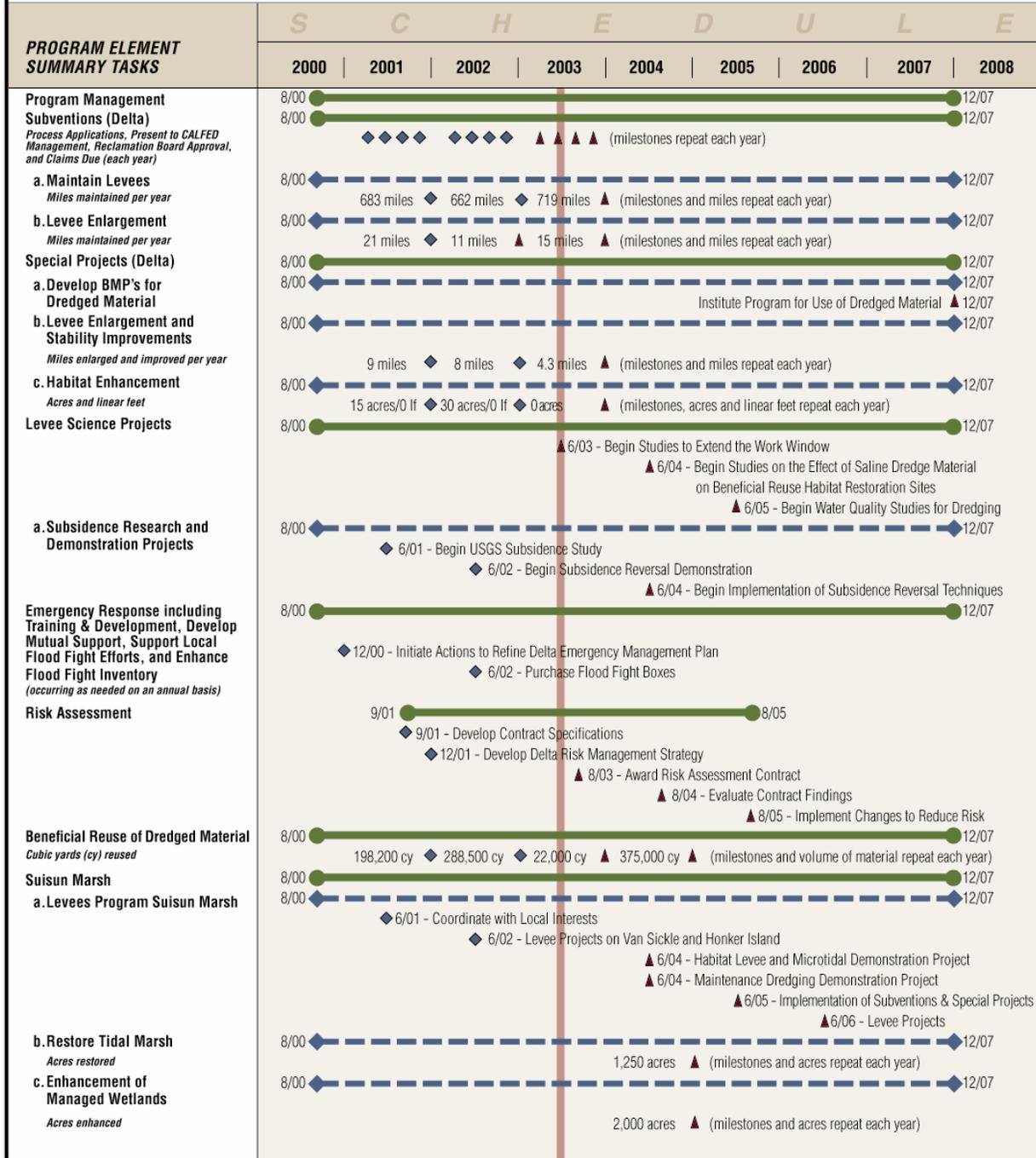
**Schedule: Summer 2003**

# Schedule

## LEVEE SYSTEM INTEGRITY

Year 2 projects improved 5.7 miles of Delta levees, and progress is being made on another 47 levee stability and habitat projects. Though requests totaling more than \$31 million were received, the program was able to fund only \$4.5 million in levee maintenance and repair projects in 2002. CALFED agencies improved emergency response capabilities in the Delta by enhancing coordination and acquiring flood fight materials. All aspects of the program have been delayed by funding reductions.

- ◆ Completed Milestone
- ▲ Remaining Milestone
- Present Schedule
- ◆ Sub-Tasks
- Date Reporting Period Ends



# Year 4 Activities

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## Base Level Protection

- The California Bay-Delta Program element of Base Level Protection is implemented continually with significant planning, coordination, contracting, scientific investigation, and cost sharing with local agencies. The Subventions Program works closely with these local agencies to provide regular levee inspections, timely repairs, restoration of crest elevation lost to consolidation, and incremental enhancements to stability that will, over time, result in obtaining 200 additional miles of PL84-99 levee cross section in Stage 1, provided that there is adequate, and timely funding. The Subventions Program also provides programmatic habitat improvement.

Local support is strong for the Subventions Program as evidenced by cost sharing of at least 25%.

**Schedule: This is an annually recurring program and will continue for the duration of available funding to support the work.**

## Levee Subsidence Control Plan

- Subsidence reversal has been studied for several years on Twitchell Island under the California Bay-Delta Levee Program. Studies have shown that it is possible to stop subsidence by shallow flooding, and that aquatic plants can be grown. However, problems with taking land out of agriculture, poor quality of the resulting young “peat soil”, and production of THM precursors require additional study before recommending a specific subsidence reversal plan. This study of peat growth continues with support from the program for maintenance on the ponds

An additional study on dispersing silts and soils on fallen aquatic plants is continuing in the current year to determine methods of reversing subsidence, with contributions from the program.

Ultimately, subsidence reversal studies must reflect outstanding scientific investigation that leads to best management practices that are implementable directly adjacent to levees, in consultation with risk assessment and cost sharing framework.

**Schedule: Studies are ongoing to determine methods of subsidence reversal that are compatible with existing Delta activities. Current methods for subsidence reversal preclude much of the agriculture in the Delta and create water quality problems with THMs.**

## Levee Emergency Management and Response Plan

- The program continues to be involved with emergency response and Delta-wide distribution of flood fight supplies. California Bay-Delta Authority has initiated talks with the 6 counties in the Delta to institute an “Area Command” that will coordinate mutual cooperation and distribute emergency response supplies Delta-wide.

We will continue our leadership role and work to fully develop this SEMS-compatible flood fight concept and seek acceptance from State OES.

The program has been working independently and with Delta reclamation districts to develop a model for mutual cooperation and conducting future flood fights in compliance with SEMS. This year we will provide a sample emergency response plan and mutual cooperation agreement to the 62 reclamation districts and work with them to develop a coordinated Delta-wide response.

The first few hours of any flood fight are critical to saving the structure and what it protects from inundation. In the interest of having supplies on hand when needed, the program will locate up to ten truck and helicopter-transportable flood-fight boxes, complete with basic supplies, throughout the Delta.

**Schedule: Emergency management and response are ongoing functions that are refined, practiced and improved on an annual cycle. The program remains committed to continue these activities for the duration of available funding.**

### **Delta Levee Risk Assessment**

- The contract to accomplish the Delta Levee Risk Assessment and Management Strategy is proceeding through the contract process. When the contract is awarded, the contractor will conduct a phased risk management analysis, with the goal of developing a prioritized list of actions that can be implemented to mitigate the risks and/or consequences of Delta levee failure. The initial analysis will assess the seismic risk, quantify resulting consequences, and formulate a strategy to manage the risk. Later phases will expand upon the initial analysis by addressing additional assets and /or risks.

**Schedule: Pursue contract award August 2003 and begin study**

### **Special Improvement Projects**

- **Suisun Marsh:**

The Suisun Marsh Levee Investigation recommends that Suisun Marsh levees can be as essential to preserving water quality as the critical Delta levees. The California Bay-Delta Program will evaluate Suisun Marsh for inclusion in the Levee System Integrity Program. If included, the California Bay Delta Authority will continue to work with the Suisun Marsh Charter Process to implement a Suisun Marsh Levee and Habitat Restoration Program with independent funding and separate cost sharing arrangements. In the absence of a sufficient charter or additional legislative authority, the program will continue to work with those portions of the Suisun Marsh that are a part of the AB-360 program.

**Schedule: Ongoing**

- **Habitat Development:**

The California Bay-Delta Levee System Integrity Program incorporates the California Water Code, Section 12300, Delta Flood Protection Program, to attain programmatic enhancements of critical Delta habitat in conjunction with its work to stabilize and restore the levees. That habitat development has been significant in the past and has taken advantage of synergies offered by contracting through the LMAs to obtain maximum value for each State dollar and provides mandated habitat improvement in conjunction with both the Subventions Program and the Special Projects Program.

**Schedule: Ongoing**

# Integration with the Science Program

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## **Proposed strategy for developing a “science-based” approach to Levee System Integrity Program actions**

- Glean most recent scientific findings as appropriate from other California Bay-Delta Authority-related actions in the estuary
- Seek independent peer reviews from the California Bay-Delta Authority Science Program and stakeholders
- Develop appropriate conceptual models for project designs based on testable hypotheses
- Develop and implement a monitoring plan that supports research needs identified by the conceptual models
- Use results of monitoring plan to guide adaptive management
- Integrate ERP/Science goals whenever possible into the levee program
- Seek project partners that significantly improve biological benefits or science understanding
- Develop and communicate science information through conferences and appropriate publications

## **Science Questions**

- The current list of science questions were generated by the Delta Levees and Habitat Advisory Committee and arose from ongoing issues raised to the Delta Reclamation Districts as they implemented levee projects. The questions were reviewed and agreed to by the group, and then reviewed and redrafted with the assistance from the California Bay Delta Authority Science Program staff. The Levee Program staff and the Bay Delta Public Advisory Committee (BDPAC) Levee Subcommittee will reconsider the original questions and develop a revised list in coordination with the California Bay Delta Science Program.
  1. How effective are the existing work windows?
  2. What is the definition of shallow water habitat?
  3. How should the effectiveness of restoration efforts on riparian, wetland, and aquatic habitat be monitored and evaluated?
  4. Are all the waters of the legal Delta critical habitat for the Delta Smelt?
  5. What are the chances of success of restoration projects in different locations?
  6. What are appropriate bank protection techniques for the levees on the inside of restored islands?
  7. Under what conditions is it appropriate to use rock placement to improve fish and wildlife habitat?

# Cross-Program Relationships

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**Ecosystem Restoration Program** – The Levee Program has achieved notable success and there are opportunities to improve the volume, type and quality of ecosystem enhancement through cooperation with the ERP. Levee Program and ERP staff will explore opportunities for improving coordination, including potential cost-sharing for mutually beneficial projects, while advancing the common goals of good science and transparency of decision-making.

**Conveyance Program** – The Delta levees define the channels of the water conveyance systems through the Delta. State-wide water conveyance abilities can be affected if a Delta levee fails.

**Water Quality Program** – The Delta levees hold back the daily tides and high flows to protect the water quality for more than 22 million Californians and 7,000,000 acres of farmland. Improvement in the reliability of water quality is a natural by-product of the maintenance and improvement of the Delta levee system.

**Water Supply Reliability** – Through consistent levee maintenance and improvements the risk of levee failure is reduced and the water supply is protected.

**Environmental Justice** – By preserving and enhancing levee stability, the Levee Program is promoting the fair treatment of people of all races, cultures, and incomes living and working in the Delta. The levees protect the homes and jobs of all communities equally. Through its environmental enhancements the Levee Program also improves opportunities for subsistence hunting and fishing.

Solving the complex issues facing the Delta requires extensive integration. For example, achieving levee element goals in isolation does not address hydrodynamic changes which can enhance water quality, tidal marsh restoration, or fish migration. Furthermore, projects to address seismic risk, potential THM precursor reductions and water supply conveyance needs will require modifications to the levee system to be consistent with those needs.

# Stage 1 Funding

Levee System Integrity Funding (\$ in millions)	Program Year							Total
	1	2	3	4	5	6	7	
State	\$30.92	\$14.24	\$4.13	\$22.16	\$21.80	\$18.72	\$0.86	\$112.83
Federal	\$0.00	\$0.19	\$0.20	\$1.10				\$1.49
Local/Water User	\$4.50	\$3.00	\$3.00	\$3.00	\$3.00	\$3.00		\$19.50
<b>Revised Stage 1 (Actual &amp; Expected Funding) <sup>1</sup></b>	<b>\$35.42</b>	<b>\$17.43</b>	<b>\$7.33</b>	<b>\$26.26</b>	<b>\$24.80</b>	<b>\$21.72</b>	<b>\$0.86</b>	<b>\$133.82</b>
<b>Original ROD (Aug, 2000) <sup>2</sup></b>	<b>\$33.00</b>	<b>\$76.00</b>	<b>\$78.00</b>	<b>\$82.00</b>	<b>\$45.00</b>	<b>\$65.00</b>	<b>\$65.00</b>	<b>\$444.00</b>
<b>Revised ROD (Dec, 2002) <sup>3</sup></b>								<b>\$444.00</b>

<sup>1</sup> Funding for Years 1-2 reflects actual State encumbrances & expenditures and grant matching funds from federal, state, and local funding sources. Funding for Year 3 reflects final State and Federal budgets. Funding for Year 4 reflects proposed Governor's and President's budgets. Expected funding in Years 5-7 includes remaining state bond funds until spent and ongoing State base funding. Federal appropriations for Years 5-7 are unknown; therefore, federal funding is not included beyond Year 4.

<sup>2</sup> Original Stage 1 funding estimates from the Record of Decision.

<sup>3</sup> ROD estimates have not been revised. The Stage 1 estimates included in the January 2003 program tracking report are the same as the ROD.

# Stage 1 Funding by Task

Levees System Integrity Funding (\$ in millions)	Program Year							Total
	1	2	3	4	5	6	7	
Program Management	\$0.59	\$0.48	\$1.57	\$3.38	\$3.38	\$3.38	\$0.04	<b>\$12.82</b>
Base Level Protection - Subventions	\$19.60	\$9.27	\$3.37	\$11.41	\$11.41	\$9.92		<b>\$64.98</b>
Special Projects	\$15.10	\$5.76	\$0.37	\$9.51	\$8.41	\$6.92		<b>\$46.07</b>
Levee Subsidence		\$0.58	\$1.51	\$0.77	\$0.66	\$0.67		<b>\$4.19</b>
Emergency Response		\$0.26		\$0.18				<b>\$0.44</b>
Risk Assessment		\$0.01			\$0.11			<b>\$0.12</b>
Beneficial Reuse		\$0.49		\$0.18				<b>\$0.67</b>
Oversight and Coordination	\$0.13	\$0.58	\$0.51	\$0.83	\$0.83	\$0.83	\$0.82	<b>\$4.53</b>
Suisun Marsh								<b>\$0.00</b>
<b>Revised Stage 1 (Actual &amp; Expected Funding) <sup>1</sup></b>	<b>\$35.42</b>	<b>\$17.43</b>	<b>\$7.33</b>	<b>\$26.26</b>	<b>\$24.80</b>	<b>\$21.72</b>	<b>\$0.86</b>	<b>\$133.82</b>
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# Project Map



## LEEVE SYSTEM INTEGRITY

### PROJECT HIGHLIGHTS

#### Reduce Levee Failures

Improved levees on over 50 Delta islands while investing funding in special projects like ecosystem and levee restoration for water quality and flood protection. Continued Delta levee raising, widening, and improvements to withstand extreme high water conditions and reduce levee failures, examples: Bradford Island, Twitchell/Webb Tract

#### Improve Emergency Response Capabilities

Identify risks to Delta levees, reduce earthquake risks, evaluate consequences and improve flood fight capabilities through the purchase and stockpiling of flood fight materials and boxes for strategic placement in the Delta.

#### Achieve Multi-program Benefits

Tangible benefits realized across program areas resulting in better water protection and quality, and enhanced habitat conditions. Examples: Twitchell Island Levee Setback/habitat creation, Decker Island Project, Clifton Court Forebay Dredging/Conveyance Improvements

